Results from Tests of the Fast Alternative Cryogenic Experiment Testbed (FACET)

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Abstract

The start of the build era for the International Space Station (ISS) has resulted in the end of regularly scheduled microgravity science opportunities such as the United States Microgravity Payload (USMP) missions on which the Lambda Point Experiment (LPE) and Confined Helium Experiment (CHeX) flew. In addition, the ISS is not scheduled to be completed enough for the Low Temperature Microgravity Physics Facility (LTMPF) to conduct experiments until 2003 at the earliest.

To address this gap in manifest opportunities, several approaches were investigated. One option identified was the possibility of a new facility compatible with one or more carriers in the baseline shuttle manifest. This new facility is called the Fast Alternative Cryogenic Experiment Testbed (FACET). During the past year, a ground prototype was designed, built and tested to prove the feasibility of a flight facility for conducting low temperature microgravity fundamental physics investigations within the constraints of the Space Shuttle Hitchhiker Siderail carrier.

To accomplish this, significant reductions in cryostat mass and volume, while maintaining cryogen lifetime performance, were necessary. Measurements of ground performance agree well with theoretical modelling and indicate that a flight system would be capable of cooling an instrument for nearly the full duration of even the longest shuttle missions (16 days). In addition, a new modular electronics architecture has been demonstrated, which will provide added flexibility for reflights of the facility with different investigations. This project serves as a pathfinder for the Low Temperature Microgravity Physics Facility (LTMPF).

The work in this abstract was carried out by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

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